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## SEARCH REPORT

Sponsor: SBS - South East

SAS Reference: S1079901

Applicant: Composite Metal Technologies Ltd

### SUBJECT OF SEARCH

A method of making a metal matrix composite (MMC) length of tube, eg a gudgeon pin (aka piston pin, wrist pin) for an i.c. engine, the method comprising:

- a) infiltrating a ceramic, eg alumina, fibre preform with molten metal, eg aluminium;
- b) consolidating into a tube by liquid pressure forming (LPF);
- c) machining the outer surface;
- d) applying a hard smooth coating eg of tool steel.

### FIELD OF SEARCH

Electronic: **DATABASES SEARCHED**

The databases searched included Derwent's World Patent Index, EPODOC, JAPIO/PAJ, OPTICS, selected full text patent databases.

*A description of the databases available is provided at the end of the report.*

### **HOST(S) USED**

The Patent Office uses a number of appropriate hosts mounting these databases.  
On this search the host used was **EPOQUE**

The Internet was searched using the Search Engines **Google, Alta-Vista, Lycos, Excite, Hotbot, GoTo, Yahoo**

### **CLASSIFICATION TERMS USED**

Key	Subclass/Heading	Classification/Subgroup
UK	F2T	
ECLA	B22D C04B C22C F16J	19/02 41/51 47/06, 47/08, 47/10, 47/12 1/16
IPC	B22D C04B C22C F16J	19/02 41/51 47/06, 47/08, 47/10, 47/12 1/16



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## **DOCUMENTS CONSIDERED RELEVANT**

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	<b>PATENT DOCUMENTS</b>	<b>NAME &amp; COMMENT</b>
1	GB 2373562 A	(Veshagh/ Pirault/ Applied Engine Technology) - see eg eg figures 4a-4g and pages 4,5 disclosing a piston pin made from a cylindrical matrix of ceramic (eg alumina or boron) fibre infiltrated under pressure by aluminium; the resulting pin is given a wear coating of a metal eg hard steel.
2	WO 02/027049 A	(3M Innovative Properties) - note the mention of "wrist pins" at page 28, lines 16-19; note disclosure of pressure forming at at page 24, lines 3-9; page 25. lines 7-20
3	EP 0373093 A	(Lanxide Technology ) - see especially example 2
4	US 4662429	(Amax) - note mention of "piston pins" in the penultimate paragraph of the description
5	JP 10-061765 A	(Toyota) - see eg the WPI and PAJ abstracts
6	JP 2-113170 A	(Toho Rayon) - see eg the WPI and PAJ abstracts
7	JP 62-049073 A	(Yamaha) - see eg the PAJ abstract
8	US 5097887	(Metallgesellschaft)
9	US 5234045	(Aluminium Company of America)

Copies of documents enclosed where they could be sourced in reasonable time.

### **i) DISCUSSION OF DOCUMENTS FOUND AND ASSESSMENT OF INNOVATION**

Document (1) seems to disclose very substantially the whole of the main steps of the proposed method as set out in the "subject of search" above (which is based on what appear to be the most important stages in the documentation accompanying the proposal), except perhaps for step (c) machining the outer surface before coating but this, given the disclosure of the other features, does not seem to be an innovative further step.

Documents (2) to (5) each disclose all the features required by the "subject of search" above except for the final step (d). However, documents (6) and (7) are examples of the application of a surface layer of hard metal to a nonmetallic fibre composite gudgeon pin - thus it seems that the application of a hard surface layer would not be innovative even without document (1).



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Documents (8) and (9) are background documents showing that it is known in general to make components such as piston parts by infiltrating a non-metallic fibre preform with light metals such as aluminium and consolidating by the application of pressure.

The search has led to the conclusion that the level of innovation in the SBS Grant Award proposal is not high, at least at the level of the overall process and its basic steps. It may well be, however, that innovative solutions will appear at the detail level if the proposal goes ahead.

## **ii) INFRINGEMENT POSITION**

This report does not purport to give a definitive legal opinion on whether any documents cited would actually be infringed by the subject of the search. This part of the report is intended to draw attention to documents found during the above prior art search which are in force (granted or still pending) and include UK coverage and which should be considered in respect of the proposed project.

Of the documents listed above, (1) has not yet been granted but is still live, while (2) and (3) are not in force.

## **iii) INVESTIGATION OF APPLICANT'S PATENT FILINGS**

On the UK Patent Register, 2 filings were found for Composite Metal Technology Ltd. (both in the form of licences from an original patentee). They are:

GB 2115327, filed 3.2.1983, granted 9.10.1985 to the Secretary of State for Defence, and now expired; Title: Process and apparatus for fibre reinforced metals.

GB 2255351, filed 30.4.1991, granted 28.9.1994 to MBF Consultancy, and in force; Title: Method and apparatus for forming fibre reinforced metal material.